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The CHEMIST

SEPTEMBER, 1940 — AMERICAN INSTITUTE OF CHEMISTS — VOLUME XVII, No. 6

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IN THIS ISSUE

Front cover picture: Bumblebee collecting Fall honey from the passion flower (May pop) of the Southeastern States.

Now is the Time . . . .

By President Harry L. Fisher

WHEN one sits down to test a new typewriter he almost invariably types, "Now is the time for all good men to come to the aid of the party." It is difficult to say who started the use of this interesting custom and why this particular line has continued to be the one so generally used.

At the present time this line has considerable significance for each one of us provided "of the party" is changed to "of the country." Once again fires of disloyalty, hatred, and subversion are being lighted, and we are all thinking about how we can preserve the principles of freedom and democracy which have made our country great.

Two of our own members are already in Washington helping to lay plans for the protection of those fine ideals which we hold so dear. We are proud that these men have been called upon for such high service and we are happy in the thought that all our other sixteen hundred members, individually and as an organization, stand ready to do their share whenever and wherever the call comes.

Scientific Organizations

"Organized scientific bodies perform an extremely useful service. No man of science should fail to join and support his scientific organizations, for in them he will receive the stimulus of association with his fellows. In these organizations his theories will meet with scientific test without controversy, his papers will be discussed constructively, and his opportunities greatly enlarged. No philanthropist can make a better investment for the future of mankind than by supporting scientific education, scientific organizations, and pure scientific research and its applications."

—A. Cressy Morrison, in "The Practical Benefactions of Pure Science," from the *Transactions* of the New York Academy of Sciences.

Teacher and Pupil

By **Ed. F. Degering, F.A.I.C.**
Alice Binkley, and Rosemary Ince,
Purdue University, Lafayette, Indiana.

Gay-Lussac*

1. THE NEF LINE OF CHEMISTS,

THOUGH Berthollet little dreamed that his desire would materialize, he did actually become the father-in-science to Gay-Lussac. And it has been said that the greatest discovery Gay-Lussac ever made was that of the adept and energetic student Justus von Liebig. Although these statements might seem a little rash, their nearness to the truth is appreciated when one ponders the fact that Liebig trained Kekulé, Kekulé trained Baeyer, Baeyer trained Nef, and Nef trained Acree, Anderson, Bacon, Beatty, Bernhard, Biddle, Denis, Evans, Glattfeld, Goldthwaite, Hanke, Hedenburg, Hesse, Hessler, Higley, Jones, Lawrie, Lewis, McLeod, McPherson, Smith, Spoehr, Todd, Upson, and Willcox. The Nef men have trained, in turn, scores of chemists who have carried on in education, industry, and research. This teacher-pupil lineage is indicated in Table I.

*Picture courtesy of Journal of Chemical Education.

TABLE I

TEACHER-PUPIL GENEALOGY CHART

Berthollet
V
Gay-Lussac
V
Justus von Liebig
V
Frederick August Kekulé
V
Adolph von Baeyer
V
John Ulric Nef
V

> Acree	> Anderson	> Bacon	> Beatty	> Bernhard
> Biddle	> Denis	> Evans	> Glattfeld	> Goldthwaite
> Hanke	> Hedenburg	> Hesse	> Hessler	> Higley
> Jones	> Lawrie	> Lewis	> McLeod	> McPherson
> Smith	> Spoehr	> Todd	> Upson	> Willcox

A. Claude Louis Berthollet, Teacher of Gay-Lussac

***By* Ed. F. Degering F.A.I.C. and Rosemary Ince.**

COUNT Claude Louis Berthollet, a distinguished French chemist, was born at Talloine, near Annecy, Savoy, on December 9, 1748. His first education was obtained at Chambery, which was followed by the study of medicine at Turin. He then went to Paris where he was connected with Lavoisier, and in 1780 he was admitted to membership in the Academy of Science in that city.

Berthollet served on many technical committees during the French Revolution. In 1794, he was appointed professor in the normal school in Paris, and in 1795, he took an active part in remodeling the Academy as the *Institut National*. In 1796, Berthollet and Gaspard Monge were chosen chiefs of a commission charged with selecting in Italy the choice specimens of ancient and modern art for the national galleries of Paris. In 1798, along with a band of scientific men he accompanied Napoleon to Egypt and returned with him in 1799. On the fall of the Directory,

he was senator and *grand officier* of the Legion of Honour and became a count under the Empire. With the restoration of the Bourbons, he took his seat as a peer. His well equipped laboratory at Arcueil was a center frequented by the distinguished scientists of the time. In 1780, at Arcueil, Gay-Lussac, a young chemist, was appointed as his assistant. The results of the research of Gay-Lussac astonished Berthollet, since they were contrary to those anticipated. Berthollet was duly impressed, however, with the outstanding ability and interest of the young scientist and expressed a desire to be his father-in-science. Berthollet died on November 2, 1822.

The most remarkable contribution to chemistry was his *Essai de statique Chimique,* in which he treated complicated phenomena of chemistry as under the strict and simple laws and mechanics. Berthollet also contributed to the reformation of the chemical nomenclature.

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B. Joseph Louis Gay-Lussac, Teacher of Liebig

By **Ed. F. Degering F.A.I.C. and Alice Binkley.**

CONDITIONS in France during the latter half of the eighteenth century and all of the nineteenth century were ripe for great scientific progress. Joseph Louis Gay-Lussac was born into the world in 1778 and his span of life extended over a portion of the period during which his native country was the great center of advancement in science.

Antoine Gay was influential at court, being *procureur* of the king, and judge at Pont-de-Noblat where the eldest son, Joseph Louis, was born. Being born at a time when education assumed great importance, and into a family of some influence, Joseph Louis and the other children of Antoine Gay were destined to enjoy great educational opportunities.

Gay-Lussac's first teacher, l'abbé Bourdieux, noticed the lad's unusual zeal for work. This almost abnormal interest in his studies, however, did not conflict with the more normal childhood desire to play; for the boy played during the day and studied at night.

At the age of seventeen, Gay-Lussac attended the boarding school of M. Savouret in Paris to prepare for entering the *École Polytechnique.*

Later he entered the boarding school of M. Sensier at Nanterre. So impressed was M. Sensier with the lad's genius that he kept the boy with him even after closing his school. In 1797, Gay-Lussac enrolled in the *École Polytechnique.*

Up to now Gay-Lussac knew very little science. He was soon to learn, however, by actual experience some practical mathematics; for, with the outbreak of the revolution in France, the Gay family experienced numerous misfortunes as was the case with all those having court influence in pre-revolutionary days. Although his schooling was not terminated, he found it necessary to defray his expenses at the *École Polytechnique* by tutoring, and many an hour of candle light was required to keep up on his studies. After spending three years at the *École Polytechnique* he graduated in eighteen-hundred with the title of engineer of bridges and highways.

In the same year Gay-Lussac received an appointment to the laboratory of Berthollet, as the latter's assistant, at Arcueil where the government's chemistry works were located. In this privileged position, Gay-Lussac carried out experiments on capillary action, dilatation of gases with rising temperature, vapor densities, and the improvement of thermometers and barometers.

The results of the research which Berthollet first assigned to his new assistant were so decidedly contrary to all that Berthollet had expected that the older man was bewildered. Being nonetheless impressed with the young scientist's findings, Berthollet humbly said "Young man, your destiny is to make discoveries, henceforth you will be my fellow-worker; I wish, it is a title which I am sure I shall some day have to glorify myself, I wish to be your father-in-science."[1]

Four years later (1804), the Institute of France commissioned Gay-Lussac and Biot, two young, enterprising, and courageous physicists, to study magnetism at higher altitudes. On the second day of August they ascended about thirteen thousand feet in a balloon with the necessary instruments for experimental observation. Dissatisfied with this experiment, Gay-Lussac went up alone forty-five days later to a height of over twenty-three thousand feet. These observations on magnetism were published in the first volume of the *Memoirs d'Arcueil.*

One of the greatest influences in the life of Gay-Lussac was his close friendship with von Humboldt. This friendship began as a result of a sharp criticism, made by Gay-Lussac, of one of von Humboldt's publications. Curious to meet his critic, von Humboldt swallowed his

pride and introduced himself to Gay-Lussac, and thus initiated the beginning of a life-long and fruitful friendship. Together they studied the properties of air brought from a height of over twenty-three thousand feet, and together they discovered the law of gases in combination. It was in a joint article of the second volume of the *Memoirs d'Arcueil* that Gay-Lussac and von Humboldt first announced the fact that hydrogen and oxygen unite to form water in the simple ratio two to one. Von Humboldt, however, disclaims any credit in the actual discovery of the law. He wrote that although he helped with the experiments, Gay-Lussac alone foresaw the importance of the results in applying them to a law encompassing all gases.

In eighteen hundred five, the two friends started on a scientific journey into Italy and Germany. During their sojourn in Rome, Gay-Lussac discovered the presence of fluoric acid in the arteries of fish.

On hearing of the death of M. J. Brisson, Gay-Lussac made a hurried return trip to Paris in the hope that he would be selected to the seat thus vacated in the Academy. This hope was soon realized.

The year of his discovery of the law of volumes (1808), Gay-Lussac accepted the professorship of chemistry at the *École Polytechnique* and in the following year he became professor of physics at the Sorbonne. He served in this capacity for twenty-three years, and then accepted appointment to the chair of chemistry at *Jardin des Plantes.*

Gay-Lussac's teaching style was imbued with mathematical spirit. Always perfectly adapted to the subject, his ideas were stated simply and directly with total abstinence from flowery language. His lectures were exactitude itself. They reflected the same meticulous order and arrangement that was found in his laboratory. His activities as a teacher were sufficiently inspiring for one of his famous pupils to pay him the following tribute. "The lectures of Gay-Lussac . . . in the Sorbonne had for me an indescribable charm; the introduction of . . . mathematical method into chemistry . . . was as good as unknown in Germany . . . Gay-Lussac acquired a mastery in experimental demonstration. What impressed me most in the French lectures was their intrinsic truth, and the careful avoidance of all pretense in the explanations. . . . An accidental occurrence drew A. von Humboldt's attention to me in Paris, and the interest which he took in me induced Gay-Lussac to complete in conjunction with me a piece of work which I had begun . . . In this manner I had the good fortune to enjoy the closest intercourse with the great natural philosopher . . . I can well say that the foundation of all my later work and of my whole course was laid in his

laboratory in the arsenal."[3] So writes no less a student than Justus von Liebig.

Throughout his life-time Gay-Lussac made and kept many friends. He found real happiness in the companionship of his fellow-workers. Three days before his death Gay-Lussac said to his wife, "Let us love one another up to the last moment; sincere affection is the only happiness." Theirs was a happy union from the time of their marriage in 1809 to his death in 1850.

The biographer Arago aptly summarizes the importance of Gay-Lussac's life in this closing paragraph, "Gay-Lussac was a good father, an excellent citizen, and an honest man in all circumstances of his life; ingenious physicist, first-rate chemist. He honored France by his moral qualities, the Academy by his discoveries. His name will be pronounced with admiration and respect in every country where science is cultivated. The illustrious academician will live eternally in the hearts and in the memories of those who had the good fortune to enjoy his friendship."[2]

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Larousse.

Further biographical sketches of chemists in the "Teacher-Pupil Geneology Chart" will appear in the next issue of THE CHEMIST.

The first Fall meeting of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS will be held on Tuesday, October 8, 1940, at The Chemists' Club, 52 East 42nd Street, New York. New committees for the coming season will be announced at that time.

The Exchange Teachership

By **Elbert C. Weaver,**
Bulkeley High School,
Hartford, Connecticut.

DURING the school year 1939-1940, the writer had the good fortune to be exchange teacher with Mr. George R. Tracy of the Polytechnic High School, Long Beach, California. The exchange included an exchange of school subjects of instruction, Eastern chemistry for Western physics, but both persons concerned were qualified by training and experience for this transfer. The exchange also involved homes, furnishings, typewriters, and libraries—a most convenient arrangement.

The exchange was effected by mutual agreement with the consent of the school administrations. However, there was the necessity of fulfilling state, county, and city qualifications for a beginning teacher in California. This process is involved, irritating, and expensive.

The professional advantages, on the other hand, far outweigh the trouble needed to overcome official inertia. Among the advantages can be listed, a refreshed point of view on teaching; a new approach to pupils and subject matter; an appreciation of the educational problems of a new region; an opportunity to visit the local chemical industries, in this case those dealing with petroleum, ceramics, iodine, and borax; and an opportunity to study at a new institution of higher learning. Returned was the zest of a beginning teacher to do an extra fine piece of instructional work, accompanied by the experience needed to make that work effective. The opportunity to extend the resources of a new laboratory to the fullest measure was most interesting. Relieved of many social and professional duties which accumulate to an established position, freedom to explore the natural and chemical phenomena of the region resulted. Such exploration is extremely fruitful in southern California. Experiences in Death Valley, Santa Catalina Island, Yosemite Valley, Boulder Dam, and many other places are those never to be forgotten. New climate meant an entirely new environment and a changed mode of life. To all these advantages must be added the joy of

making a host of new friends among pupils, faculty, and neighborhood.

Disadvantages of such a transfer include unfamiliarity with customs and pupils in a new school; the necessity of spending much time to learn location and routine in a new laboratory; extra expense, both for travel to the location and for expeditions to take full advantage of the new situation, and temporary loss of original professional contacts and resources.

In this particular case the writer was kept on the Hartford payroll as a teacher on leave. California law requires that the incumbent receive the salary, so both salaries passed through the writer's hands. The agreement was, of course, that each should receive his original salary. Both exchangees had to fulfill the requirements for teaching in a new state, an obstacle which must be considered seriously in contemplating such an exchange. It is desirable that exchanges such as this one be between schools of similar size and persons with positions of comparable responsibility.

The year was thoroughly enjoyable, refreshing, and stimulating. The rewards are well worth the trouble and expense. For those who can exchange positions for a year the transfer is recommended. The results are most valuable to a chemistry teacher, for a study of science is one of the best preparations for appreciation of travel.

The Young Chemist and the Government Service

***By* Louis Marshall, F.A.I.C.**

The fourteenth of a series of articles on the opportunities for chemists in the Government service.

THE Customs Service of the Treasury Department is the agency which is responsible for the collection of duties on the commodities which are imported into this country from abroad. It is, generally speaking, the Bureau which procures the "external revenue" of the Government, as distinguished from the revenues which are obtained as the result of domestic activities, and which are collected by the Bureau of Internal Revenue.

The task of classifying, for revenue purposes, the vast array of products which arrives at these shores daily, is one of unusual complexity. It has its basis, however, in the Tariff Act of 1930. This Act of Congress was passed in order "To provide revenue, to regulate commerce with foreign countries, to encourage the industries of the United States, to protect American labor, and for other purposes." It is a very comprehensive document giving the rates of duty on the thousands of items which together make up the importations of the United States. From the standpoint of the commercial interests which are involved, the Act is one of the most important on the statute books, and in its administration, the part played by the chemical laboratories of the Bureau of the Customs is of vital importance.

The first section of the Act prescribes the rates of duty which are to be paid on commodities included under the schedule of "Chemicals, Oils, and Paints". For example, shipments of acetic acid which contain not more than sixty-five per cent by weight of the acid, are required to pay 1⅜ cents per pound. If the consignment contains more than sixty-five per cent by weight a tax of two cents per pound is levied. The chemical analysis to determine the quantitative proportion of acetic acid in a representative sample of the consignment, is carried out in one of the laboratories of the Bureau. Similarly, the Act prescribes a duty of one cent per pound on boric acid; five cents per pound on chloracetic acid; seventeen cents per pound on citric acid; and two cents per pound on dilute lactic acid which contains less than thirty per cent by weight of the acid; four cents per pound on the more concentrated product containing from thirty to fifty-five per cent, and nine cents per pound on those consignments which contain more than fifty-five per cent by weight of the acid.

The common alkyl aldehydes, such as acetaldehyde and butyraldehyde, as well as the hydroxy alkyl amines, and unsaturated alcohols, are taxed six cents per pound, and thirty per cent *ad valorem*. Acetone and methyl ethyl ketone and their homologues pay a duty of twenty per cent *ad valorem*. Wood alcohol is taxed eighteen cents per gallon. Likewise, the duties which are to be levied on caffeine, theobromine, carbon tetrachloride, Rochelle salt, compounds of titanium, aluminum hydroxide, ammonium carbonate, calomel, chloral hydrate, coumarin, phenolphthalein, animal, and vegetable oils as well as a host of other products, are stated. The Tariff Act is, in fact, a revealing document illustrating the importance of chemicals to modern industry, and the laboratories of the Bureau of the Customs are confronted with a wide variety of

products requiring identification and analysis for the purpose of assessing the proper duty against each type.

Since the passage of the Tariff Act of 1930, many trade agreements have been concluded with foreign nations. The essential purpose of these commercial treaties is the promotion of international trade and their effect has been a lowering of the import duties placed upon many commodities in return for like concessions to our exported goods on the part of other nations. For instance, the duty on chloracetic acid has been reduced fifty per cent to two and one-half cents per pound. The tariff on caffeine has likewise been changed from $1.25 to $.90 per pound; that for theobromine, from $.75 to $.65 per pound, and so on. It may be noted, however, that these carefully planned attempts at facilitating a free flow of the world's goods have, at the present time, been nullified by the war.

Both the "Tariff Act of 1930" and the "Changes in Import Duties since the passage of the Tariff Act of 1930", have been published by the Government Printing Office. They may be consulted at the larger libraries or purchased from the Superintendent of Documents.

The problems involved in properly classifying many of the articles which are imported into this country are often very difficult in spite of the detailed provisions in the Tariff Act, due to the amazingly large variety of products which are imported. The list of imports in the "Custom House Guide" covers not less than thirty thousand commodities ranging from abaca fiber to zoedone, which is a mineral water dutiable at ten cents per gallon. If a commodity is placed in the wrong classification, it will usually be taxed incorrectly; and since large sums of money are involved in customs transactions, the matter of accuracy in classification is of the utmost importance. If an importer feels that a shipment of goods consigned to him has been charged an excessive rate of duty, he has the right to appeal to a body known as the United States Customs Court, and to a higher court if necessary. Since the classification of many products is dependent upon the results of laboratory examination, the chemists and other scientific workers of the Customs Service must have not only a thorough knowledge of laboratory procedure, but they must also acquire an understanding of the legal implications which are involved. Indeed, the technical men of the Service often appear as expert witnesses at the trials before the Customs Court.

The results of these trials are summarized in a weekly Government

publication known as *Treasury Decisions.* It can be bought from the Superintendent of Documents, Government Printing Office, for ten cents a copy, or, on a yearly subscription basis, for three dollars. The publication is usually available for reference purposes, however, at many of the large public libraries, and in view of the extraordinary diversity of the topics which are treated, it usually makes very interesting reading.

One of the recent Treasury decisions concerned a shipment of wax imported by an American manufacturer for use as an emulsifier in the manufacture of skin creams and ointment bases. The product was made from wool grease by a process which removed the animal fat by means of ether. The non-saponifiable matter in the grease was taken up by bone char, from which it was removed by solvents, which were then evaporated off. The residue, which was the product in question, was declared by the official examiner of merchandise to be an animal grease, and as such, it fell within paragraph 52 of the Tariff Act of 1930 which provides a duty of twenty per cent *ad valorem* on animal and fish oils, fats, and greases. The manufacturer disagreed with this opinion, claiming that the product was neither an oil, nor a fat, nor a grease, but a wax, and therefore entitled to free entry under paragraph 1796 of said act, which provides for exemption from duty of animal, vegetable, or mineral waxes. The court was called upon to decide the question as to whether the product was an animal oil, fat, or grease, or an animal wax. The importer produced two witnesses at the trial, both expert chemists. They testified that the physical and chemical properties of the material showed that it fell within the classification of "wax", as that term is defined in the dictionary, and that it did not come within the meaning of the terms "oil", "fat", or "grease". For example, the total acetylizable constituents calculated as cholesterol amounted to 89.7 per cent. This indicated that the product was a wax, as did the fact that its saponification number was only 12.6. In addition, the product was exposed during the trial to the rays of the sun, and in the softened condition resulting from this treatment, it became very sticky, but not oily or greasy, and this was another indication of the wax-like nature of the product. A third witness was a government chemist working for the Customs Service. He also testified that his analysis of the product convinced him that it came within the common definition of the term "wax". No testimony was offered at the trial to prove that the merchandise was an oil, fat, or grease. The court therefore decided that the product was an animal wax, entitled to free entry under paragraph 1796 of the Tariff Act, and accordingly, judgment was rendered in favor of the plaintiff.

Another recent case, which was decided mainly as the result of chemical analysis, is summarized in Treasury Decision 48732. It concerned a shipment of zinc sulphide over which a controversy had arisen regarding its proper classification under the Tariff Act.

The importer, (known as the plaintiff) stated during the trial that the product was intended for use in the manufacture of x-ray screens. He claimed that it was assessable for duty at the rate of three cents per pound, quoting as his authority paragraph 93 of the act which specifically provides that rate of duty for zinc sulphide. The Government, (the defendant) on the other hand, attempted to prove that the merchandise could not be classified properly as zinc sulphide. In support of this contention, the defendant produced several witnesses at the trial, one of whom was a chemist for the Bureau of Customs. He testified that he analyzed two representative samples of the consignments. One of them was found to contain barium, molybdenum, strontium, titanium, zirconium, and manganese, in addition to the zinc sulphide. The other sample consisted principally of cadmium sulphide and zinc sulphide.

These analyses tended to prove that the elements and compounds found in the samples were not present as accidental impurities, but were deliberately added for the purpose of preparing the merchandise for its ultimate use in the manufacture of x-ray screens. Another proof that the products were not imported as zinc sulphide were the entry papers, which declared that their value ranged from $7.28 to $7.70 per pound, whereas the price of pure zinc sulphide varied between eight cents and thirteen cents per pound.

In view of this evidence, the court decided that the entry of the merchandise as zinc sulphide was not permissible, and that it properly belonged under paragraph 5, which provides a duty of twenty-five per cent *ad valorem* on all chemical elements, compounds, and mixtures not especially provided for elsewhere in the act.

Is a product which is known as settled lime juice "unfit for beverage purposes", and therefore entitled to entry at five cents per pound, or is it a "fruit juice not especially provided for", and as such dutiable at seventy cents per gallon? Treasury Decision 48556 answers this question.

The importer explained at the trial that the product is made by crushing the whole fruit and then straining and allowing the material to settle. The oils in the fruit rise to the top and are separated. The juice that remains behind is the product in question. It is treated

with an equal part of water, thirty per cent of sugar, and a small quantity of fruit acid in the manufacture of a product known as "Lime Cup". The latter is consumed as a beverage after having been diluted with three parts of water.

A sample of the settled lime juice was sent to one of the Customs laboratories for analysis. It was found to contain less than ½ of 1 per cent of alcohol by volume. In 100 cc. of the product, there were 9.41 grams of total solids, 0.02 gram of phosphates as P_2O_5, and 9.54 grams of free acid calculated to citric.

One of the plaintiff's witnesses, an expert chemist, testified that his analysis agreed substantially with that of the Government laboratory (unusual phenomenon!). He further stated that the high proportion of acid in the product rendered it unfit for use as a beverage. It was brought out during the trial, however, that the customary dilution of the imported product brought the acid content down to the point where it became suitable for beverage use. It was also noted by the court that the wording of paragraph 48, which was favored by the importer, is juice of limes, "unfit for beverage purposes". This was taken as being of different significance than a phrase like, "unfit for the use as a beverage". It was the opinion of the court that the first phrase meant that the product must be, either because of the presence of impurities or for other reasons, unfit for use *in* beverages, rather than *as* beverages. Actually, however, the product was employed in beverages, and therefore it was felt that it could come within the purview of paragraph 48. For these reasons, it was decided that the merchandise was properly classified as a "fruit not especially provided for" and therefore dutiable at seventy cents per gallon.

The Tariff Act of 1930 provides a duty of fifteen per cent *ad valorem* upon soap powders, and this paragraph recently formed the basis of a suit brought by a corporation against the United States. The case involved a cleaning and degreasing preparation consisting of trisodium phosphate, sodium carbonate, sodium silicate, and a small proportion of impurities. The plaintiff claimed that this material was a soap powder and as such dutiable at fifteen per cent *ad valorem*. The Government conceded that the product was used for cleaning purposes, but maintained that it was not a soap since it contained no fatty acids and therefore did not conform to the definition of the term "soap". The court upheld the latter view and decided that a duty of twenty-five per cent *ad valorem* was properly laid under paragraph five of the Tariff

Act providing this tax for "All chemical elements, all chemical salts and compounds . . . not especially provided for".

A great many of the customs trials are concerned with matters which do not require chemical examination, and at some of them, the hair-splitting distinctions attempted by opposing counsel are very amusing. However, in view of the large sums of money which may be saved or lost depending upon the success or failure in establishing these distinctions to the satisfaction of the court, the parties to the trials are seriously concerned at the outcome and find no amusement at all in the proceedings. For instance, one of the recent trials, summarized in Treasury Decision 48231, concerned certain rubber balls which could be inflated to diameters ranging from seven and one-half to fourteen inches. They were used mostly at beaches and playgrounds and the question before the court for adjudication was whether these balls were designed primarily for use in physical exercise, or whether they were meant to be toys primarily used for the amusement of children. If the former, they were dutiable at thirty per cent *ad valorem*, whereas if they came within the second classification, a duty of seventy per cent *ad valorem* was demanded. Both the plaintiff (the importer), and the defendant (the Government) introduced witnesses at the trial. They described the ages of the persons playing with these balls, and the manner of their playing. The testimony of the witnesses called by the defendant was to the effect that the balls were used mostly by children ranging up to twelve years of age, and that the games they played were designed primarily for their amusement. The plaintiff's witnesses declared that they had seen many adults play with the balls. This latter testimony would place them outside the scope of the term "toy" which is defined in the act as an article chiefly used for the amusement of children. The plaintiff also attempted to show that the physical exercise, and not the amusement, was the main purpose of the games. At the conclusion of the testimony the court decided that the balls were primarily designed for use in physical exercise, and therefore entitled to entry at the lower rate of duty. There are many attorneys who specialize in these customs litigations, and they often find it necessary to consult chemists as well as other scientists on the technical matters which some cases involve.

One of the very important functions of the chemical laboratories is the detection of frauds and other violations under the customs laws. For example, the invoice accompanying a shipment may state that it consists of sodium carbonate and therefore is dutiable at one-fourth cent

per pound, whereas laboratory examination shows that the merchandise is potassium carbonate, upon which the duty is three times as great. Similarly, a consignment of oil invoiced as rapeseed for which a duty of six cents per gallon is levied, is proven, as the result of laboratory examination, to be soy-bean oil, dutiable at three and one-half cents per pound. The Bureau of the Customs has to be constantly on the alert against these sophistications which are designed to defraud the Government of its own revenues, but which also have the effect of giving the fraudulent merchandise an unfair competitive advantage over legitimate importations. Curiously enough, the frauds which are perpetrated in violation of the customs laws are generally designed to make an expensive article seem cheap, thus taking advantage of the lower rates of duty. This type of deceit is, of course, precisely the opposite of the age-o'd but ever young practice of making a cheap item seem expensive; which practice gave rise to the old saying, "Let the buyer beware." The service rendered by the chemical laboratories in detecting and preventing these customs frauds is, therefore, of the utmost value to Government and legitimate business.

The nine laboratories of the Bureau of Customs are under the supervision of the Division of Laboratories. They are responsible for the examination of about eighty thousand samples of merchandise each year, and are located at strategic points throughout the country, in order to facilitate the scientific examination of goods arriving at the principal ports of entry. The largest of these laboratories is the one at 201 Varick Street in New York City. The volume of work accomplished at this station is great enough to permit of specialization on the part of the chemists. One of them may be engaged in the field of dyestuffs, another devotes his time to oils, a third to sugars, a fourth to textiles, a fifth to coal-tar intermediates, and so on. The other laboratories of the Bureau are located at Boston, Philadelphia, Baltimore, Savannah, New Orleans, Los Angeles, San Francisco, and Chicago. In the smaller stations, such as the one at Savannah, it is usually not possible to specialize in a particular field because the volume of work, as well as the personnel, is more limited. The chemists at these smaller stations therefore have to become familiar with the methods of analysis of a wide variety of products. From the standpoint of the individual chemist, it is doubtless preferable to have the opportunity of acquiring a thorough mastery of one important line of work, rather than merely to learn the rudiments of many different fields. Specialization is much more likely to lead the way to one's personal development and advancement, whereas, work in

widely varying fields makes one, as the saying goes, "Jack of all trades, master of none". However, it is not disadvantageous for the young junior chemist, first starting out upon his professional career, to receive an appointment which permits him to acquire experience in different fields of work. He will then be in a better position to decide what his specialty should be.

The scientific activities of the Customs Service combine to a marked degree the technical aspects inherent in the identification and analysis of products, with the legal implications which are involved. The Customs Service is a highly important function of the Government, and it is one of its oldest institutions, even antedating the establishment of the Treasury Department itself. Indeed, the oldest class of officials in the Civil Service of the Government were customs officers. The activities of the Bureau of Customs serve to protect American industry against enforced competition with those foreign products which have been produced as the result of ill-paid labor; or which have been "dumped" upon these shores in an effort to capture the American market at the price of the existence of American producers; or which have been subsidized by foreign Governments for the purpose of increasing their exports or which have been smuggled into this country to avoid the payment of taxes. The revenues which are collected from Customs duties form a substantial part of total Government collections. In the fiscal year of 1939, for example, the total duties on the importations into this country amounted to $321,409,995, and that year, of course, was characterized by a sharp decrease in the free flow of goods among the nations of the world. The Bureau of Customs has built up a large and efficient organization. It maintains a Customs School of Instruction which provides correspondence courses explaining the work of the Service to its interested employees. About nine thousand men and women are engaged in a multitude of activities necessary to the proper prosecution of the work of the customs service. The acknowledged importance of the laboratories in this work is another illustration of the fact that chemistry has become more intimately woven into the fabric of modern industry and commerce. The Division of Laboratories of the Customs Service is one of a number of public institutions which, without the fanfare of publicity, performs its important functions with quiet efficiency. It employs a total of forty-two chemists who are distributed among the grades as follows: Two principal chemists, three senior chemists, four chemists, nineteen associate chemists, ten assistant chemists, and four junior chemists.

William Wallace Buffum

It is with deep regret that THE AMERICAN INSTITUTE OF CHEMISTS announces the death of its Honorary member, William Wallace Buffum, treasurer and director of The Chemical Foundation, Inc., New York, N. Y., who died in Montclair, N. J. on June twenty-second after a brief illness of a heart ailment.

Mr. Buffum was born at Friendsville, Penna., on August 25, 1888. From 1917 to 1921, he was chief accountant in the Washington office of the Alien Property Custodian. Since 1921 he had been a member of The Chemical Foundation. He took an active interest in the furtherance of chemical education in this country, in the organization of the American Institute of Physics, and in the development of newsprint from Southern pine. He was also greatly interested in the utilization of chemistry in the fight against various diseases, such as cancer, tuberculosis, etc.

Through his connection with The Foundation, he became business manager of several periodicals, including *The American Journal of Cancer, Sewage Works Journal* and *The Journal of Clinical Investigation.*

Mr. Buffum was a member of The Chemists' Club, Montclair Golf Club, and Beacon Hill Golf Club. He became an Honorary Member of THE AMERICAN INSTITUTE OF CHEMISTS in 1937.

He leaves a widow, Mrs. Henrietta Carr Buffum, two sons, William W. Jr., and John Carr Buffum, and a daughter, Miss Marcy Buffum, all of Montclair; his mother, Mrs. Augusta Buffum of Binghamton, N. Y., and two brothers, Frederick and Harry Buffum.

James Flack Norris

THE AMERICAN INSTITUTE OF CHEMISTS records with deep regret the death of its Medalist for 1937, James Flack Norris, director of the organic research laboratory of Massachusetts Institute of Technology, on August 3, 1940, in Boston, Massachusetts. He had been ill for three months following an eye operation. He was sixty-nine years old.

Dr. Norris was born in Baltimore and attended The Johns Hopkins University, from which he received the Ph.D. degree. From 1895 to 1904, he served as instructor and assistant professor of organic chemistry at Massachusetts Institute of Technology, followed by eleven years at Simmons College as professor of chemistry. He then taught

one year at Vanderbilt University and returned to Massachusetts Institute of Technology, where he remained from 1916 until his death. During the World War he held the rank of Lieutenant Colonel and was in charge of the United States Chemical Warfare Service in England.

Dr. Norris was elected to honorary membership of the Royal Institute in London in 1925, while he was president of the American Chemical Society. He was a member of the executive board of the National Research Council, lecturer on organic chemistry at Harvard College, Clark University, and Bowdoin College; secretary of the Society of Arts in Boston; president of the Chemistry Teachers' Association of New England and of the Technology Club; former vice-president of the International Union of Pure and Applied Chemistry; member of the National Academy of Sciences; fellow of the American Academy of Arts and Sciences, and an honorary member of the Chemical Society of Roumania.

He was the author of numerous books and papers on chemistry and was known as an international authority on organic chemistry.

He is survived by his widow and two sisters.

Edward Carl Uhlig

THE AMERICAN INSTITUTE OF CHEMISTS records, with deep regret, the death of its Life Member, Edward Carl Uhlig, on August 22, 1940.

Mr. Uhlig was born in New York, N. Y., on February 12, 1868, and he received the B.S. degree from Cooper Union. He also studied at Brooklyn Polytechnic Institute. From 1892 to 1904, he was chemist for Whitall Tatum Company, glass manufacturers, at Millville, N. J. In 1904, he joined the Brooklyn Union Gas Company and installed the Company's laboratory. During the World War he was in charge of the Company's production of toluol. Mr. Uhlig retired from his position as chief chemist of the Brooklyn Union Gas Company on July first.

He was the author of many articles on glass analysis, water analysis, and also of the *Gas Chemists' Handbook*. Among the societies to which he belonged were the American Chemical Society, the Society of Gas Lighting, the Chemists' Club, the American Gas Association and the American Association for the Advancement of Science. He was also a charter member of THE AMERICAN INSTITUTE OF CHEMISTS.

He is survived by his wife and a brother.

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THE annual Plant Trip of the Pennsylvania Chapter was held on Saturday afternoon, May twenty-fifth, at the Glassine Paper Company of West Conshohocken.

The group met first in the laboratory and were told something of the history of the Company. They then proceeded through the plant, observing in a systematic way the various stages in the manufacture of paper.

The bales of imported and domestic pulp are received at the Pulp Receiving Department. Here they are broken open and the contents subjected to the action of bleaching powder. The bleached pulp travels through the washers to the beaters. At this point the various chemicals and colors are added, after which the pulp mass is diluted to 99½ per cent water and is allowed to flow onto a bronze wire screen. On this the sheets of paper are formed. The pressing and drying of the sheets, which follow, is a continuous operation, as is the reeling at the finishing or dry end of the Paper Machine. From here the paper passes through the super calenders where it receives a very high finish and transparency. Finally it reaches the Finishing Department where the embossing and roll rewinding is completed.

The Laboratory was open for inspection. Here the various control tests which are run on the pulp and paper at various stages in its process were carried out under the testing conditions in the control temperature and humidity room. Hand sheets were made on pulp which had been prepared in the laboratory in order to better demonstrate the action that takes place on the paper machine.

Following is the list of those who made the Plant Trip:
H. A. Heiligman, E. J. Lavino & Company; Dr. and Mrs. G. E. Seil, E. J. Lavino & Company; L. D. Newitt and Mrs. Newitt, Coopers Creek Chemical Company; Edward L. Haenisch, Villanova College; F. J. Limacher, Villanova College; C. W. Rivise, Philadelphia, Penna.; George R. Bancroft, Jefferson Medical College; Lorenz Hansen, Jefferson Medical College; Joel S. Harris and Guest, Durite Plastics; Herbert Schenker, Consumers Testing Laboratories; D. William Sedan, Abbotts Laboratories; Walter Obold, Drexel Institute of Technology; R. W. Herlst, E. J. Lavino & Company; J. L. Martin, E. J. Lavino & Company; E. G. Beinhart, Eastern Regional Research Laboratories; E. M. Beinhart, University of Cincinnati; A. C. Angus, Philadelphia Clinical Laboratory; and E. F. Cayo and wife, Foster Company.

Sincere thanks are due the staff of the Glassine Paper Co. and the technical director of the Valley Forge Laboratories through whose courtesy the trip was made possible.

Washington

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THE annual election was held at a meeting of the Washington Chapter on Monday, July 29, 1940, at 8:30 P.M. at the Wardman Park Hotel. The new officers elected were: President, A. H. Warth; vice-president, L. F. Rader, Jr.; secretary, M. Leatherman; treasurer, L. R. Heiss.

The Chapter has had a most successful year; (1) Attendance at meetings, luncheons and dinners has been excellent; (2) A number of new members were secured; (3) Recommendations were transmitted through the National Organization to the Reed Committee for U. S. Civil Service improvement; (4) Coöperation was offered to the U. S. Civil Service Commission; (5) A questionnaire was sent out in order to gather data and necessary information concerning the chemical profession; (6) A joint committee of professional societies to consider civil service matters has been formed; (7) Stimulation of interest in chemistry and in raising scholastic standards for the profession has been accomplished through the awarding of medals in seven universities; (8) Closer relations with the national organization have been effected.

The Polytechnic Institute of Brooklyn, New York, announces the appointment of Doctor H. Mark of Hawkesbury, Canada, as professor of organic chemistry. Professor Mark, previously of the University of Vienna, will direct research in the field of high molecular weight compounds at the Polytechnic.

For the year 1940-41, he will offer two courses of lectures in the Graduate Division. These will be given in the evening session and will be available for employed chemists in the metropolitan area. One of these courses will deal with the physical aspects of organic chemistry and the other with the chemistry of rubber.

Details may be had from Professor Raymond E. Kirk, F.A.I.C., at the Polytechnic.

BOOKS

REFINING PRECIOUS METAL WASTES. By C. M. Hoke, F.A.I.C., 1940. *Metallurgical Publishing Company.* XIII—Chap. XXII—292 pp., Appendices 5—62 pp. Illustrated. $5.00.

This indispensable book for the smaller jewelry shop, dental laboratory, and refiner, while written for that audience, should find a larger circle. Although making no pretense as a scientific textbook, any chemist and worker in the precious metals, whether silver, gold, or platinum group, will find it of much practical worth. It is written in simple language and fortified by carefully selected illustrations. The typography is excellent; the index appears satisfactory. The necessary chemistry is elementary and fed in small and digestible dosages. Considering the main audience to which it is directed, this is as it should be. Questions and answers, chosen from Miss Hoke's twenty-four years of experience, lend a novel touch of particular value to the laymen users, many of whom have had little or no chemical training.

The book specifically concerns itself with the recovery and refining of precious, but secondary, products and wastes. The title is to the point. All three common methods, wet or chemical, fire and electrolytic refining are discussed and explained in the abstract and the concrete. Starting with simple cases such as gold or silver, methods are explained step by step. The succeeding chapters then take up in turn more complex combinations including the platinum group, of course. Low-grade sweeps, high-grade polishings, plated ware and spent electrolytes, for example, are covered efficiently.

The latter part of the book is devoted to an appendix which includes a selected list of references, discusses hazards and refers to the various stamping acts and trade practices. The book is to be commended to those who refine or produce precious metal wastes. Miss Hoke has done a good job.

—THOMAS A. WRIGHT, *F.A.I.C.*

THE MERCK INDEX, *Merck and Company, Inc.* Fifth edition, 1060 pages, $3.00.

This new edition of the *Merck Index* contains nearly twice as many pages as the previous edition, and lists 5900 descriptions of individual substances; 4500 chemical, clinico-chemical reactions, tests, and reagents by the authors' names, formulas for preparation of culture media, fixatives and staining solutions; useful tables; antidotes for poisons; literature references; and other information. The book is well-bound and conveniently arranged. The international atomic weights for 1939 are printed on the inside front cover for convenience. Literature references are generously included throughout.

The pharmacist, physician, dentist, and veterinarian, are all considered where the uses of the products are mentioned, and this book will be of great value to anyone seeking information in these fields, or to research workers who wish to establish prior information on the subject which they are investigating, as well as serving as a valuable reference book for chemists in general.

NATIONAL PAINT DICTIONARY. By Jeffrey R. Stewart, F.A.I.C. *Stewart Research Laboratories.* 1940. 9" x 12". 154 pp. $5.00.

The editor of the *National Paint Bulletin* has prepared in this book a comprehensive glossary of the terms, materials, and equipment used in the manufacture of paints and allied products, which will be welcomed by those connected in any capacity with this industry.

The trade names of raw materials in the paint and varnish industries, whether registered or not in the patent office, are included. Definitions are given at first simply, then followed by the technical and scientific facts pertinent to them. Two hundred illustrations, tables, and such data as conversion charts, nomographs, physical and chemical properties of commonly used raw materials, tank capacity calculation, solubility tables, etc., greatly increase this dictionary's value. Blank pages are inserted for memorandum purposes, and the book is exceptionally well printed and bound.

Fortune magazine, in its August issue, discussed synthetic rubbers and why America is going ahead slowly in their production at the present time.

The thirty-second biennial edition of *The Naturalist's Directory* will be published in September. This directory comprises the names, addresses and special subjects of interest of naturalists in all parts of North and South America as well as a list of scientific periodicals and natural history museums. The price is $2.50. Publisher: The Naturalist's Directory. Salem, Mass.

Corning Glass Works, on the twenty-fifth anniversary of Pyrex laboratory ware, announces a new laboratory glassware, Pyrex Vycor, fabricated from a new ultra-low expansion, ninety-six per cent silica glass. Its new low thermal expansion has exceptional chemical stability and a high softening point. Information may be obtained from a new supplement to the Pyrex laboratory glassware catalog, available on request.

Glyco Products Company, Inc., 148 Lafayette Street, New York, N. Y., announces that their new catalog, *Chemicals by Glyco,* is now ready for distribution. It will be sent on request. This catalog and *The Glyco Cosmetics Manual* may also be obtained in Spanish editions.

Gilbert E. Seil, F.A.I.C., technical director of E. J. Lavino and Company, was guest lecturer at the special summer program in ceramics at the Massachusetts Institute of Technology, Cambridge, Massachusetts, from July eighth to thirteenth. Dr. Seil lectured on the dry pressing of refractories, illustrating his lecture with micro-projections and lantern slides.

Dr. Seil has been appointed a member of the Technologic Committee on Manganese formed by the National Research Council of the National Academy of Science, at the request of the Advisory Council to the Council of National Defense. Mr. Clyde Williams of Battelle Memorial Institute is chairman of the Technologic Committee on Manganese.

THE SCIENCE ANGLER

Kenneth E. Shull, J.A.I.C.

Being told to "go to grass" may, in the future, be considered a health rule—not an insult. Experiments have shown that the vitamin content of certain grasses is far superior to that of our present-day fruits and vegetables.

Naturally, it would not be practical, nor appetizing, to sit down to a dish of mower trimmings *per se*. A method has been devised, however, whereby the healthy properties of grass have been incorporated into a palatable food. The product is known as cerophyl and contains, among other things, 280,000 I. U. of Vitamin A and 1300 I. U. of Vitamin B. Contrast this to, say Popeye's muscle building food, which contains "only" 8400 I. U. of Vitamin A and 28 I. U. of Vitamin B.

All we can say is "Long live King Nebuchadnezar"—and make a bee line for the back yard.

Today, quite a number of industrial plants are using silver for lining pipes, pumps, and other pieces of equipment, especially those which are subjected to the action of corrosive substances. The plating (0.03 inches thick) is usually placed on copper by an electrolytic method. Although not used to any extent as yet, the royal metal platinum has been advocated for these same purposes.

Both of these metals entail a high initial cost; however their great durability, low maintenance cost, and the readiness with which they may be cleaned makes for a sound and appreciating investment.

"One man's food is another man's poison". But the dish upon which it rests may be poisonous to all. For some time, lead oxide has been incorporated into many tableware glazes. Recently it has been found that enough of this material may dissolve to cause lead poisoning. As a result the National Bureau of Standards has devised special tests which tell in a very short time whether or not the particular article is fit for use.

Paradoxical as it may seem, it is nevertheless true that England on the one hand is sacrificing the lives of her youths on the field of battle and on the other striving to make her streets avenues of peace.

Several experimental tests are being conducted at the present time in order to find ways to improve conditions of the highway. One fifteen mile "stretch" of road is completely lined with a white opaque glass curb. This is said to possess exceptional reflecting qualities which cause it to "stand out" much more clearly at night than does the conventional concrete type.

Several methods have appeared recently in the literature for making a tough cow more soothing to the teeth. One of these utilizes a proteolytic enzyme obtained from the common milkweed. Known as Asclepain this substance performs its detoughening duties by breaking down the proteins into simpler, more easily digested substances.

Another interesting report has appeared concerning the action of alcohol on bacteria—rather a controversial subject. The latest results seem to indicate that ordinary soap and water are just as effective as drunkard's delight in ridding one's hands of microscopic pests, perhaps more so in the case of spore formers.

And once again, the fact is established that alcohol exerts its disinfecting powers only in the presence of moisture; thus a 70-80 per cent solution shows off its potent powers almost immediately, whereas a 95 per cent solution may not even kill at all.

The application of hydrochloric acid to concrete road surfaces has been found to roughen them to such an extent as to materially reduce skidding.

NORTHERN LIGHTS

By Howard W. Post, F.A.I.C.

There seems to be a "revival" of interest in certain processes for the treating of bituminous sands, especially in Alberta Province. There is a Charles Gower process which is essentially a leaching out of the sands by petroleum fractions within the kerosene range. Gasoline, diesel fuels and asphaltic fractions are obtained. Then there is the process used by Abasand Oils, Ltd., by which the sand is first broken down by hot water to a smooth pulp. The water-sand mixture is then aerated and the petroleum material comes to the top as a froth, fifty per cent petroleum in content. Kerosene extraction is then resorted to.

Canadian Chemistry and Process Industries continues, "A number of cracking tests have been made on separated bitumen and samples submitted to the Research Council of Alberta and other laboratories from 1926 forward. These tests made in different places indicate a good yield of gasoline of high octane rating. The gasoline has a high sulfur content, and if this were reduced to specification limits by drastic treatment, the octane rating might be somewhat sacrificed. The immediate market for bituminous sand products is the supply of diesel and burning oils for the mining camps of the North West Territories."

The Eugene W. Kettering Collection of three hundred and eighty scale models of world famous aircraft was placed on exhibit in the General Motors' Building at the New York World's Fair on July twelfth, where it will remain on public display until the end of the Fair.

John L. Collyer, president of the B. F. Goodrich Company, announced its new synthetic rubber, Ameripol, to industry at a reception held in the Waldorf-Astoria, New York, N. Y. on June fifth. Pilot plant operation to produce this butadiene synthetic rubber will be under way in September.

CHEMISTS

The American Chemical Society will hold its one hundredth convention in Detroit, Michigan, during the week of September ninth. On Tuesday afternoon, there will be a symposium "Glass: What Is Old? What Is New?" under the chairmanship of Dr. Alexander Silverman, F.A.I.C., head of the Department of Chemistry in the University of Pittsburgh.

The introductory talk which Dr. Silverman will give will be followed by one on X-ray studies by Dr. Bertram E. Warren of the Massachusetts Institute of Technology. The next paper will be on additive properties by Dr. Maurice L. Huggins of the Eastman Kodak Company. Dr. George W. Morey of the National Geophysical Laboratory will speak on the physical characteristics of glasses. Dr. Harold R. Moulton of the American Optical Company will discuss optical developments. Dr. Henry H. Blau of the Corning Glass Works will conclude the symposium with a talk on chemical developments.

The entire afternoon is reserved for this symposium.

The Food Research Laboratories, Inc., New York, N. Y., have moved from 114 East 32nd Street to their newly constructed laboratory building at 48-14 33rd Street, Long Island City, New York.

Food Research Laboratories were organized in 1922 by Dr. Philip B. Hawk, F.A.I.C., for research and testing in the food and pharmaceutical industry. Dr. Bernard L. Oser, F.A.I.C. is vice-president and director of the Laboratories.

Dr. H. R. Mauersberger, in charge of evening textile courses at Columbia University, announces that the following courses, beginning September 26, 1940, will be given to qualified students without examination: Textiles ez3—Spinning and Weaving of Rayons and Spun Rayons; textiles ez13—Textile Chemistry—(lectures and laboratory); textiles ex1—Spinning and Weaving of Cotton; textiles ez9—Woolen and Worsted Manufacture; textiles ez5—Woven and Printed Design; marketing e15—Merchandising and Marketing of Textiles, and textiles ez11—Identification, Analysis and Testing of Textiles.

The course in merchandising and marketing of textiles is a new course to be given by Mr. Sydney S. Anhalt instead of Dr. Kennedy of Pacific Mills as previously announced.

Address inquiries to the Director of University Extension, Columbia University, New York, N. Y.

William C. Schoenfeld, a graduate of Brooklyn Polytechnic Institute with a B.S. in chemistry, has been added to the staff of Foster D. Snell, Inc., Brooklyn, N. Y.

C. A. Elvehjem, F.A.I.C., professor of Agricultural Chemistry at the University of Wisconsin, led the symposium on "The Effect of Processing on the Vitamin Content of Foods", at the Food Technologists' meeting in Chicago, on June seventeenth to nineteenth. He discussed "The Nature of Vitamins with Particular Reference to the B Complex".

Where to Get Industrial Mobilization Information

The United States Department of Commerce reports that many letters have been received requesting information on industrial mobilization. Many are from manufacturing firms that wish to assist the Government, such as by adapting factory facilities to national defense needs. Those desiring such information are requested by the War and Navy Departments to procure current information from the twenty-seven major field purchasing offices of the Navy or the forty-six major field procurement offices of the War Department, as the officials at these field offices are informed about present purchasing needs and industrial mobilization pertaining to their areas.

The Chemical Warfare Service purchasing office for current supplies is at Edgewood Arsenal, Edgewood, Md. Emergency program purchasing is handled by the Army Chemical Warfare Service Procurement Districts, which are located at the following addresses: Boston, Mass., 2000 Post Office and Courthouse Building; Chicago, Illinois, 1113 Post Office Building; New York, N. Y., Room 404, 45 Broadway; Pittsburgh, Penna., 1014 New Federal Building; San Francisco, Calif., 117 Federal Office Building.

The Medical Department purchases articles required for general hospital use and the veterinary service. Purchasing is done by the Medical Department Procurement Districts as follows: Brooklyn, New York, 58th Street and First Avenue; Chicago, Illinois, United States Post Office Building; St. Louis, Missouri, Second and Arsenal Streets; San Francisco, Calif., Presidio.

The Ordnance Department's purchasing is done by the Army Ordnance Districts, as follows: Birmingham, Alabama, 302 Comer Building; Boston, Mass., 2004 Post Office and Courthouse Building; Chicago, Illinois, 309 West Jackson Boulevard; Cincinnati, Ohio, 521 Post Office Building; Cleveland, Ohio, 1524 Keith Building; Detroit, Michigan, 611 Federal Building; Los Angeles, California, 409 Chamber of Commerce Building; New York, N. Y., Room 1214, 90 Church Street; Philadelphia, Penna., 1417 Mitten Building; Pittsburgh, Penna., 1032 New Federal Building; Rochester, N. Y., 1118 Mercantile Building; St. Louis, Missouri, 935 Customhouse; San Francisco, California, 118 Federal Office Building; Springfield, Mass., 3640 Main Street; Wilmington, Delaware, Nemours Building (explosives only).

The Navy Department maintains purphasing offices at Alameda, Calif.; Anacostia, D. C.; Annapolis, Md.; Boston, Mass.; Charleston, S. C.; Dahlgren, Va.; Great Lakes, Ill.; Indian Head, Md.; Key West, Fla.; Lakehurst, N. J.; New London, Conn.; New York, N. Y.; Newport, R. I.; Norfolk, Va.; Pensacola, Fla.; Philadelphia, Penna.; Portsmouth, N. H.; Portsmouth, Va.; Puget Sound, Wash.; San Francisco, Calif.; San Diego, Calif.; Washington, D. C.; and Yorktown, Va.

Fordham University, at a centenary jubilation, will celebrate the one hundredth anniversary of its founding by John Hughes in Fordham, New York. Formal invitations will be issued soon.

The University was started in 1841 with six students which have been increased through the years to more than eight thousand.

Chemistry as a Career*

By Francis J. Curtis

Development Director, Monsanto Chemical Company, St. Louis, Missouri.

MENTION "chemist," and into the popular mind jumps immediately a picture of a man, preferably middle-aged and with a beard, dressed in a beautiful, spotless white coat, usually with a Russian collar, holding a test tube to the light against a bewildering background of retorts. Few pictures could be further from the fact. Not only are many chemists not concerned with laboratory work, but those who are wear either very plain uniforms or just old clothes. Test tubes are used rarely and retorts almost never.

This disparity between the popular conception and the truth is merely illustrative of the fact that chemists are used in a much wider variety of positions than is usually understood. Similarly they are important key men in many more industries than the natural one of making chemicals, and they are found in the fields of fertilizers, rubber, paper, leather, steel, textiles, medicinals, water, petroleum, and last but far from least, in teaching and in fundamental research.

It is almost axiomatic that one should not talk, at least publicly, on subjects which he does not know, and therefore, since I am familiar with the manufacture of chemicals themselves, I will confine my remarks to that industry, particularly since opportunities in other industries will be very similar in kind, though different in detail.

First, however, let us look at what chemistry does to the man himself. Although we are all born with certain definite qualities, some good, some bad, most of us have a good many others pressed upon us by the conditions and activities of our lives. The chemist, like everyone else who wishes to succeed, has to have the fundamental qualities necessary for success, which qualities have been publicized *ad nauseam.* The intensive and successful study of chemistry breeds of itself rather definite characteristics. Above all the chemist has been taught to be exact. I can remember how much I was impressed in studying quantitative analysis by an old professor who warned us that when we were transferring material from one beaker to the other, quantitatively, we should wash out the material until we were absolutely certain there was nothing left and then ten times more. This training in exactness makes the chemist skeptical of high-flying generalities and facile characterizations. There is bred in him a belief in reliance only on facts, experimentally verified. Clear reasoning, both inductive and deductive, is imperative if he is to reach the correct conclusion, and, because he is backed by experimental facts and clear reasoning about them, he is willing to stand up and fight for what he conceives to be the truth and sees no reason why it should be concealed.

From the nature of the case the chemist has been trained to be willing and almost anxious to get his hands

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dirty and as a natural result to despise those who do not. He is inclined to be rather a poor mixer and to minimize or fail to see the importance of other fields of endeavor than his own. Of course, these are generalizations and everyone can probably pick a chemist or two from his acquaintance who does not measure either up or down to them. Human beings are far too complex to fit any law and all we can observe are general trends.

The popular conception of the work of the chemist is research, yet throughout the chemical industry chemists will be found in almost any spot on which you can put your finger. No matter where they are found they will be out trying to catch ideas. In as rapidly changing a field as the chemical one, new ideas are the life blood of a company. Many concerns have departments which specialize in obtaining new products, processes, or improvements. There is an extensive and expensive chemical literature, the volume of which has the ordinary chemist floored, by which he keeps in touch with the developments and progress in the industry and by which occasionally he stimulates himself to thought. Unsocial as they usually are, chemists do attend scientific meetings, swap ideas and information, and put salve on their bump of curiosity. Characteristic of the openness of the industry is the fact that no man is expected or desired to confine his thinking to his own particular bailiwick.

Research is the prima donna of the chemical world, much publicized but no less essential. It is estimated that some $250,000,000 a year is now spent in this country on chemical research. The surprising progress of the chemical industry is no miracle, nor is it necessarily inherent or peculiar to that industry. What is peculiar, in the sense of different, is the willingness of management to plow back in the form of research a fairly large proportion of earnings. In this the chemical industry differs widely from a very large majority of the rest.

If an idea may be likened to an embryo, in the research laboratory it is born; and, like all children, in the beginning it is a struggling thing with a mortality rate which if applied to humans would leave us aghast. Those who survive have to be tough. The chemist in the research laboratory works out his process in glassware on a very small scale, under which conditions he can control his reactions and perform large numbers of experiments in the shortest possible time. When the infant becomes adolescent and it begins to appear as though it may have chances of survival, the growing pains begin. The chemist must transfer his work to a larger scale and carry out his process in apparatus of the type of which a real plant could be built. In this case the mortality may not be so high, but the struggles of adolescence are never easy. Adulthood is reached and our baby idea has grown into manhood and is embodied in a large-scale plant. Even here the research chemist takes an interest, like a father watching his young son start off to a new job.

However, the main responsibilty at this point passes to a new set of chemists, the plant supervisors and control laboratories. Young chemists or chemical engineers start working in these control laboratories where they test daily the quality of the products being manufactured, pass upon their suitability for shipment, and, incidently, learn a good deal about the operation of the processes. When they are sufficiently experienced and opportunities arise, they

are promoted to actual plant operation as assistants to some department supervisor. It is the supervisor's duty to see that his departments are run smoothly, that raw materials of proper quality are available, and that the products are of satisfactory grade. He must be an expert in the details of the process, know how to correct defects which appear, be able to handle his workmen and to look out for their welfare. He is on tap usually twenty-four hours of the day and seven days a week. If he can keep his costs down and his quality up, he is a success.

Chemists were first used in research; temperamental and difficult to handle as they were, there was no way of getting around the fact that it was necessary to have a chemist to do chemical research. It was, however, quite a long time before even the chemical industry in a large way felt that plant supervisors should necessarily be technically trained. To be sure, this was in the simpler days of the industry. Up to rather recently the same statement could have been made about the sales organizations in the chemical industry. However, that situation is now changing and we are finding more and more chemists going into sales. All the books on salesmanship, for what they are worth, give one fundamental precept. "Know your product." While no one will deny that the non-technical man can know chemicals and that many of them know them extremely well, it would seem to be almost axiomatic that with a technical training they would have known them better. The weakest rejoinder that a salesman can make, when asked by a prospective purchaser some question on the action of his product, is to say, "Well, I'll have to ask my technical men." While there is grave doubt in my mind that every chemist can be taught salesmanship, there is no doubt at all that any salesman of average mental capacity can be taught chemistry, at least enough for his needs.

Slowly these facts have been borne in on the chemical industry. The first result was the rather general creation of technical sales departments as substitutes for the real thing. These departments pick up the new products as developed, carry them to the customers, explain their uses and put them over. After the market has been worked out, the product is turned over to the general sales department to follow in a more or less routine manner. The technical sales department also, due to its close contact with the customer, has a chance to form excellent ideas as to possible new developments to better serve the industry. These when turned over to the research laboratory may eventuate in new products of improved quality. Technical sales is the skirmish line of research and, as a body of specialists, may continue even in that time when the sales department itself has become thoroughly technicalized.

The qualities developed in the chemist by his training are exactly those which lead him to a position as an executive: accuracy, willingness to face facts, impatience with high-spun theory, good reasoning faculties, and a capacity for action. An executive who is always forced to take technical conclusions on faith is obviously not making the decisions.

The question has already occurred to your mind: What about the small concern which cannot afford such an elaborate system with technical men placed at every point of the operation? To answer this query has arisen a body of chemical consultants who maintain extensive laboratories and contacts, who have wide connections and varied

knowledge such as a small company could not hope to have. These men and their organizations are available for such as require them and for as long as desired. They perform an extremely necessary service and provide a fascinating field of endeavor.

Life comes from life and there is none without, so it takes chemists to make chemists. The teaching of chemistry is as fundamental to our economic life as the industries which it serves. As a career it offers perhaps more than any other open to chemists, the possibility of the pursuit of truth for truth's sake. It must be remembered that in industry the work of the chemist is devoted to a definite end, conditioned by the necessities of the industry which he serves. He cannot wander far afield or dally down pleasant side lanes. His curiosity is often restricted. The teacher, on the other hand, is encouraged to try his wings, to delve into what seems to him to be interesting, and he has the time and opportunity to do so. In many cases he acts as a consultant to industry, keeping his outlook more practical and his pocket better lined.

Without the fundamental research carried on very largely in our universities, chemical development as we know it would slowly come to a stop. As in the Middle Ages the monasteries were looked upon as power houses of prayer, so now our fundamental research laboratories are power houses sending out the current to activate the motors which run our chemical life machinery. Too high tribute cannot be paid to these men who spend their lives searching for truth and working on the fringes of our knowledge. To them is given perhaps the highest career in chemistry.

To the man choosing a career the most important question is, "Will I like it?" If he does like it he still may be no good in it, but if he does not like it he is sure to be. The right man in the right place will find the career of chemistry a lot of fun—there is no higher praise.

The Golden Rule and Democracy

By Jerome Alexander, F.A.I.C.

AMERICA is arming to-day to defend not only its territory and its citizens, but also the principles upon which democracy is founded. These principles are under attack because of lack of intelligent and constructive coöperation by the statesmen and citizens of all countries in making practical application of the Golden Rule, politically, socially, and industrially.

The Golden Rule teaches us to treat others as we ourselves would like to be treated. This "dawn of conscience", as Professor Breasted called it, was of slow growth and emergence. It is the main line of cleavage between man and brute, the essential moral basis of civilization. Confucius considered it the positive essence of his teachings, although he had put it in negative form: "What you do not like when done to yourself, do not do to others." According to the seventh chapter of Matthew, Jesus of Nazareth stated it thus: "Therefore all things whatsoever ye would that men should do to you,

do ye even so to them; for this is the Law and the Prophets." Thus did He epitomize the teachings of the Old Testament.

Practical application of the Golden Rule is opposed by natural selfishness, the so-called innate animal nature of man, which urges him to accomplish his desires without regard for the rights and feelings of others. To overcome this natural selfishness, no mere network of laws will serve, no form of government. We must give heed to the ethical teachings of religion, based upon the painfully learned ethical experience of mankind; and all this is epitomized in the Golden Rule, the common denominator of all religions, those of the East as well as those of the West.

But teaching is not enough. Too many there are who give only lip-service to the ethical and democratic principle of the equality of all men on the basis of their personal merits, irrespective of their social, racial, religious, or national origins. Though stated in words, the Golden Rule is dynamic, and has its real existence in action. The more widespread our practice of this ethical ideal, the more closely knit do we become in presenting a common human front in the never-ending battle against pain and disease, poverty and famine, and the uncontrollable forces of nature. Such coöperation is the general objective of most scientists.

Utterly opposed to coöperation under the Golden Rule in the common causes of humanity are the loudly-voiced doctrines, by whatever social or political name they may be called, which incite men to hate, envy, and strife, aiming to divide them along social, racial, religious, or national lines of cleavage. We need love, not hate; emulation, not envy; constructive coöperation, not destructive conflict. And despite defections due to the imperfections in human nature, let us adhere to and continually strive to attain our ideals of democracy, under which all citizens can become mental, moral, and physical freemen. Democracy is the forward movement in civilization. Let us never retreat to any form of tyranny or absolutism, under which men speedily become mental, moral, and physical slaves.

Walter S. Ritchie, F.A.I.C., head of the department of chemistry of Massachusetts State College, Amherst, Massachusetts, was recently elected president of Alpha Sigma Chi, national honorary professional chemical society. The election took place at the National Convention of this fraternity in California.

Dr. Ritchie received the doctor's degree from the University of Missouri in 1922. He taught at that University until 1934 when he was called to Massachusetts State College. He is widely known for his work in food chemistry.

Stevens Institute of Technology, Hoboken, New Jersey, announces evening graduate courses in chemistry, chemical engineering, mathematics, engineering economics, mechanical engineering, electrical engineering, and ordnance engineering to be given, beginning with the week of September 23, 1940. Tuition fee is $12.00 a credit. Registration for the first semester closes Friday, September twentieth.

These courses carry credit in an approved program of studies leading to the degree of Master of Science.

EMPLOYMENT

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Chemist, F.A.I.C. B.S. and M.S. degrees. American. Over thirty years' experience in Agricultural Chemical work along soil, fertilizer and plant lines in both research and analytical capacity. Experienced in by-product waste utilization and patent searches. Available for consulting work. Please reply to Box 51, The Chemist.

Chemist, J.A.I.C. B.S. 1940. Six months' experience during summers in rubber factory. Fluent French and German. Interested in position as laboratory assistant or translator. Please reply to Box 55, The Chemist.

Chemist, F.A.I.C., A.C.S. Doctor of Chemistry. 29 years manufacturing and developing experience in intermediates, dyestuffs, metal salts and food products. Original manufacturing processes developed. Successful in handling labor. Considerable consulting and business experience. First class references. Please reply to Box 35, The Chemist.

Chemist, J.A.I.C., A.B. degree 1940. Phi Beta Kappa. Two years of college work in analytical chemistry—qualitative and quantitative; also courses in inorganic, organic, physical chemistry. Interested in any chemistry work. Please reply to Box 53, The Chemist.

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Applications will be rated as received at the United States Civil Service Commission until further notice, and certification made as the needs of the service requires. If sufficient eligibles are obtained, notice may be given that receipt of applications is closed.

Applicants must have had at least eighteen semester hours study in organic chemistry in a recognized college. Announcements and forms may be obtained from the Secretary of the Board, U. S. Civil Service Commission, at any first or second class post office, or from the U. S. Civil Service Commission in Washington, D. C.